L 24453-65   EWT(1)/T/EED(b)-3   Pae-2   IJP(c)   GW/MJW

AUTHOR: Rayzer, P. Ya.   30
                                                                 B

TITLE: The Ninth All-Union Conference on Aerial Surveying

TOPIC TAGS: aerial mapping, aerial surveying, photogrammetry,
photogrammetry conference

ABSTRACT: The Ninth All-Union Conference on Aerial Surveying will be
held in Leningrad in February, 1965. The principal theme will be new
achievements in aerial surveying and its application in scientific
research and the national economy, and the prospects for its future
development. The conference will consider problems involved in the
theory and practice of all modern forms and methods of aerial sur-
veying (photographic, geophysical, visual, etc.), design of new types
of instruments and equipment, and development of new types of films.
There will be a discussion of the applicability of aerial survey
methods in geologic, topographic, soil, and other types of mapping
and in geological, geophysical, geographic, hydrographic, soil, geo-
Card 1/3

L 24453-65

ACCESSION NR: AP5001957

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botanical, forestry, and agricultural investigations, as well as in exploration and study of natural resources and engineering projects. The introduction of electronics and automation into aerial surveying and the analysis of the resulting data, and the training of personnel also will be considered. Reports will be rotaprinted and distributed to participants to facilitate discussions. The following will be discussed at the plenary sessions: present status and prospects for development of aerial geodesy, aerial photographic surveys and their future development, aerial photogrammetric methods, apparatus, instruments and their improvement, theoretical and practical aerial topography and the problems involved, use of aerial methods in geological investigations, training of specialists, and information on the International Conference on the Use of Aerial Surveys for the Study of Natural Resources. Among the problems to be discussed at section meetings are: principles of interpretation as related to the theory of information, principal trends in aerial geophysical work, use of aerial surveys and photogrammetry for the solution of hydrometeorological problems, use of aerial surveys in agriculture for intensification of the latter and current problems of aerial surveys in forestry. The conference will be divided into the following sections: aerial sur-

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ACCESSION NR: AP5001957

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veys and photogrammetry, geology and geography (including geophysics and hydrography), agriculture and forestry, and engineering and planning. The conference will last 5 days.

[08]

ASSOCIATION: none

SUBMITTED: 00   ENCL: 00   SUB CODE: ES

NO REF SOV: 000   OTHER: 000   ATD PRESS: 3179

Card 3/3

RAYZER, P.Ye.

Interdepartmental Commission for Aerial Photographic Surveying.
Geod. i kart. no.7:73-74 Jl '61.   (MIRA 14:7)
            (Aerial photogrammetry)

RAYZER, P.Ya.

"Information Bulletin of the Scientific Research Institute of
Motion Pictures and Photography" no.1 and no. 2. Reviewed by
P.IA.Raizer. Zhur. nauch. i prikl. fot. i kin. 6 no. 3:238-239
My '61.   (MIRA 14:5)
                    (Bibliography--Photography)

RAYZER, P.Ya.

Systematization of the scientific and technological literature
on aerial photogrammetry and methods used. Geod.i kart. no.3:
72-76 Mr '62.   (MIRA 15:12)
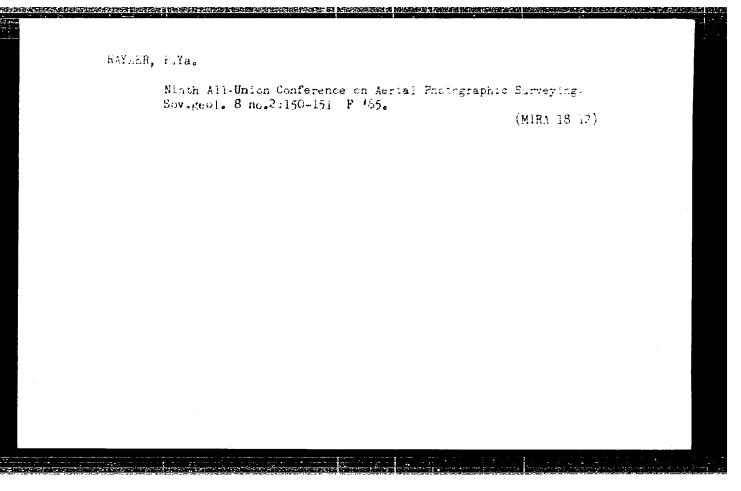   (Bibliography—Aerial photogrammetry)

RAYZER, Petr Yakovlevich; LOBANOV, A.N., otv. red.; SKACHKOV, S.A.,
        red.izd-va; VOLKOVA, V.V., tekhn. red.

        [Development of aerial methods in Russia and the Soviet Union]
        Razvitie aerometodov v Rossii i Sovetskom Soiuze. Moskva, Izd-
        vo Akad. nauk SSSR, 1963. 63 p.   (MIRA 16:4)
                    (Aeronautics in surveying)

RAYNER, I.Ya.

Ninth All-Union Conference on Aerial Photographic Surveying.
Sov.geol. 8 no.2:150-151 F '65.

(MIRA 18:12)

L 25550-66   EWT(1)/T-2   IJP(c)   GW

ACC NR: AP6012324   (A)   SOURCE CODE: UR/0006/65/000/011/0003/0008

AUTHOR: Rayzer, P. Ya.

ORG: none

TITLE: Results of the Ninth All-Union Conference on Aerial Photography

SOURCE: Geodeziya i kartografiya, no. 11, 1965, 3-8

TOPIC TAGS: geophysic conference, aerial photography, mapping

ABSTRACT: The ninth All-Union Conference on Aerial Photography was held in March 1965 in Leningrad. The conference was convened by the joint committee on aerial photography to discuss the present state of the art in the Soviet Union. The convention was attended by more than 700 representatives from 240 organizations in 56 cities of the Soviet Union. The participants in the conference examined problems associated with theory and practice in all modern forms and methods of aerial photography, design of new instruments and equipment, and development of new types of film. Particular attention was given to problems of using aerial photography for making topographical and geologic maps. The use of electronics and automation in photography and processing was also discussed. A number of papers were devoted to training of specialists. The conference was divided into 7 sections: aerial photography and photogrammetry, geography, geology, geophysics, soil science and geobotany, engineering geology and engi-

Card 1/2   UDC: 528.7(203)

L 25550-66

ACC NR: AP6012324

neering surveys. Eighteen reports were read at the plenary sessions and 160 reports and papers were given in the sectional meetings with more than 100 people taking part in debates. A brief summary of some of the reports is given together with the names of their authors. A resolution was passed to publish the transactions of the confer- ence.

SUB CODE: 08,14/   SUBM DATE: 00/   ORIG REF: 000/   OTH REF: 000

Card 2/2

L C0789-67   EWT(l)/T/PSS-2   IJP(c)   JGS/GW

ACC NR: AR6014273   SOURCE CODE: UR/0270/65/000/011/0019/0020

AUTHOR: Rayzer, P. Ya.

TITLE: Experience in applying the theory of knowledge and logic to the interpretation of aerial photographs

SOURCE: Ref. zh. Geodeziya, Abs. 11.52.132

REF SOURCE: Sb. Kompleksn. deshifrir. aerosnimkov, M.-L., Nauka, 1964, 176-186

TOPIC TAGS: aerial photograph, mathematic deduction, mathematic induction, light filter, mathematic logic

ABSTRACT: Photographic reproduction, which is accomplished with a system consisting of an objective, a light filter, and film, is unique visual perception. The interpretation process consists of development, identification, and interpretation of the objects of study, which are depicted on the aerial photograph (direct signs) or not depicted (indirect signs). Accordingly, the investigator, who works with the photographs, creates the original representation of these objects, and then he switches to logical thought. This transition is accomplished chiefly by means of indirect signs. The forms of inference with the use of indirect signs are analogy, induction, and deduction. Such forms of knowledge of causal relationships as hypothesis and version are examined. The examined categories are accompanied by examples as applied to interpretation. G. Gonin /Translation of abstract/
SUB CODE: 12, 14
Card 1/1
                                                                    UDC: 527.77

RAYZER, V.D.   (Moskva)

Taking into account bending moments in the calculation of
spherical shells which are nonrectangular in design. Stroi.
mekh. i rasch. sooruzh. 5 no.6:14-16 '63   (MIRA 17:7)

RAYZER, V.D., inzh. (Moskva)

Calculations for bending moments in the design of a flat
conoid shell and flat shells of varying curvature. Issl. po
teor. sooruzh. no.12:257-265 '63.   (MIRA 16:6)

(Elastic plates and shells)

RAYZER, V.D. (Moskva)

Calculations for ruled shells according to the momentless theory.
Stroi. mekh. i rasch. scor. 4 no.3:6-11 '62.   (MIRA 15:6)
(Roofs, Shell)

RAYZER, Yaroslav

Furniture designing in Czechoslovakia. Der.prom. 11 no.2:29-30
F '62.   (MIRA 15:1)

1. Direktor Instituta razvitiya mebel'noy promyshlennosti, g.Brno,
Chekhoslovatskaya Sotsialisticheskaya Respublika.
                              (Czechoslovakia--Furniture)

AUTHOR: RAYZER, Yu.P.   56-6-33/56
TITLE: On the Structure of the Front of Strong Shock Waves in Gases.
              (O strukture fronta sil'nykh udarnykh voln v gazakh, Russian)
PERIODICAL: Zhurnal Eksperim. i Teoret. Fiziki, 1957, Vol 32, Nr 6, pp 1528-1535
              (U.S.S.R.)

ABSTRACT: In consideration of radiation the inner structure of the front of
              a strong shock wave is dealt with. Theoretically the following
              equations are derived: 1.) Equation of hydrodynamics and radiation
              transmission, which describe the inner structure of the front of a
              shock wave. 2.) Approximative solution for the case of an
              "ordinary shock wave" $T_1 < T_k$. 3.) Approximative solution for
              the case of the "isothermal jump:" $T_1 > T_k$. (With 6 Slavic Refer-
              ences and 2 Illustrations).

ASSOCIATION: Academy of Sciences of the U.S.S.R.
PRESENTED BY:
SUBMITTED: 29.11.1956
AVAILABLE: Library of Congress

Card 1/1

KAYZER, Yu. P.

AUTHORS: Zel'dovich, Ya.B., Rayzer, Yu.P.   53-3-6/6

TITLE: Shock Waves with a Large Amplitude in Gases (Udarnyye volny bol_
                shoy amplitudy v gazakh)

PERIODICAL: Uspekhi Fiz. Nauk, 1957, Vol. 63, Nr 3, pp. 613 - 641 (USSR)

ABSTRACT: The present paper investigated the various physical processes
                taking place on the front of a shock wave as well as their in-
                fluence upon the internal structure of the front. Particular
                attention is paid to the radiation and absorption of light and
                to the heat transfer in the front due to radiation, which are
                discussed. These phenomena mainly determine the structure, the
                thickness, and the brightness of the shock wave with large ampli-
                tude. In the present survey the technically important problems
                of the supersonic flow round   wings with shock waves etc.
                is not investigated.
                The work begins with a short survey of experimental methods.
                The so-called shock tubes are at present being frequently used
                for these investigations. Hitherto temperatures of up to 20 000°
                have been attained in shock waves. Another wide-spread method
                for the production of shock waves is that by explosions. Shock

Card 1/

56-2-28/51

AUTHOR: Rayzer, Yu. P.

TITLE: The Glowing of   Air During a Strong Explosion and the
             Minimum Brightness Effect of a Fireball (Svecheniye
             vozdukha pri sil'nom vzryve i effekt minimuma yarkosti
             ognennogo shara)

PERIODICAL: Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, 1958,
             Vol 34, Nr 2, pp 483-493 (USSR)

ABSTRACT: This work investigates the optical properties of the air
             below 6000°. From the center of explosion a shock wave
             propagates, the path of which, according to Sedov
             (reference 3), well satisfies the automodel law $R \sim t^{2/5}$.
             As long as the amplitude of the wave is sufficiently high,
             the surface of the front of the shock wave glows brightly
             and forms the so called fireball. The brightness or the
             effective temperature of the fireball (that is the temperature
             of an absolutely black body, which produces exactly the same
             radiation intensity as the fireball) decreases by the time
             corresponding with the decrease of the true temperature
             behind the front of the shock wave. At a certain moment t_{min}
             the glowing of the front of the shock wave ends and the

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The Glowing of   Air During a Strong Explosion and the   56-2-28/51
. Minimum Brightness Effect of a Fireball

boundary of the glowing body separates from the front of the
wave. Then occasion the brightness of the fireball passes a
minimum and then starts to increase again. The dimensions
of the fireball now grow by far slower and the front of the
shock wave shifts far forward. Two diagrams schematically
illustrate the dependence of the effective temperature of the
fireball, of the trajectory of the shock wave, and of the
boundary of the fireball on time. In the explosion $\sim 1/3$
of the explosion energy is emitted by radiation. The author
here investigates the optical properties of the air at
temperatures below 9000°. These properties depend on the
nitrogen oxides NO and NO_2, which form in heated air. On
this base the following experimentally observed phenomena
are explained: The glowing of the shock wave at temperatures
considerably below 9000°, the immediate stopping of the
glowing at $\sim 2000^\circ$, the stripping of the front of the shock
wave from the boundary of the fireball, and the mentioned
effect of the brightness minimum. The first two paragraphs
Card 2/3   of this work deal with the computation of the effective

The Glowing of   Air During a Strong Explosion and the   56-2-28/51
Minimum Brightness Effect of a Fireball

temperature of radiation and with the optical properties
of the air at temperatures above 6000°. The third
paragraph discusses the optical properties of the air at
temperatures below 6000° and the possible mechanisms of the
absorption of light at temperatures below 6000°. Then a
detailed report on the brightness minimum of the fireball
is made.

There are 3 figures, 3 tables, and 14 references, 8 of which
are Slavic.

ASSOCIATION: AS USSR (Akademiya nauk SSSR)

SUBMITTED: August 26, 1957

AVAILABLE: Library of Congress

1. Air-Optical properties-Theory

Card 3/3

Zel'dovich :a. B.   Kompaneyets A ... Rayzer, Yu. P.

SOV/50-54-5-33/61

n .... okhlazhdenii vozdukha
(zlucheniyem, I) General Description of the phenomenon and
the Weak Cooling Wave (Obschaya kartina yavleniya i slab .a
voina okhla_ hdeniya)

ABSTRACT: This paper discusses the approximation theory of the cooling
wave and the fact is established that in this layer the tempera-
ture abruptly decreases from the initial value to the "tem-
perature of transparency" T_t. A diagram shows the successive
changes of the temperature distributions, by taking adiabatic
cooling into account. The authors try to find the solution
of the nonsteady equations of the radiating heat exchange.
These solutions have the form $T(x - ut)$ and correspond to
a plane wave propagated with the constant velocity in the
gas at the given temperature T_1 and with the density c_1. But
these equations are not solved by exact solutions of the kind

Card 1/3

On Radiation Cooling of Air. 1. General Description of the Phenomenon and the Weak Cooling Wave

$T(x, t)$. The causes of this fact are discussed. If the cooling wave propagates in expanding air, adiabatic cooling transports the air layers, which were cooled by the radiation into a region of temperatures so low that they become practically transparent. The authors do not investigate the additional absorption of the light at low temperatures due to oxide and dioxide of nitrogen produced in the heated air. Moreover, the intense molecular absorption at low temperatures (which is essential for the ultraviolet radiation with 2000 $\overset{0}{A}$) is neglected. There are two ways of taking the real facts into account. First, it is possible to introduce an additional constant term A (which characterizes adiabatic cooling) into the energy equation. Secondly, it is possible to exclude from the investigation the weakly absorbing gas region which is cooled below the temperature of transparency. In order to determine the radiation flux, the authors apply the diffusion approximation to the exact kinetic equation which takes into account the angular distribution of the radiation in an approximate manner. In a great part of the cooling wave the true radiation density U is very similar to its equilibrium value U_p. In the region with cooled air,

Card 2/3

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    .... U is very different from U.. Lastly, the authors
    calculate the special case where T. is only a little higher
    than T.. In this case it is possible to find the exact ana-
    lytical solution of this problem. There are 5 figures, 1
    table, and 6 references, ... of which are Soviet.

.. ..:   Institut khimiche koy fiziki (Institute of Chemical Physics)

.UBM.TT.. :   December .., 1947

    **1. Air—Cooling   2. Heat transfer—Theory   3. Mathematics
    —-Applications**

.... 3..

AUTHORS: Zel'dovich, Ya.B., Kompaneyets, A. S.,   SOV/56-34-6-11/51
                  Rayzer, Yu. P.

TITLE: On Air Cooling by Radiation (Ob okhlazhdenii vozdukha
                  izlucheniyem)

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, 1958,
                  Vol 34, Nr 6, pp 1447 - 1454 (USSR)

ABSTRACT: The first part of this investigation discussed the cooling
                  of a great volume of heated air in a qualitative manner,
                  it dealt with weak cooling waves. This paper, however, deals
                  with the theory of a strong cooling wave in which the
                  higher temperature may be infinitely high. This paper has
                  to determine the radiation flux which moves from the
                  front of the cooling wave towards infinity and to obtain
                  the temperature distribution on front of the cooling
                  wave. One of the following two methods has to be used:
                  either to introduce a constant term into the energy equation
                  or to determine from the very beginning the "transparency
                  temperature" T_2 according to a formula given in the first
Card 1/4   part of this investigation. In the latter case one has

to assume that the air is absolutely transparent for
$T < T_2$. The first method gives a more complete description
of the temperature distribution because it allows to
investigate the change of the temperature in the cooled
air and to take into account the absorption of the light
in the air. But this method leads to unnecessary mathe-
matical complications at temperatures above the transparency
temperature. It is more advantageous to investigate the
internal structure of the cooling wave according to the
second method; the corresponding energy equation is given
explicitly . The authors investigate the lower part of the
cooling wave where the temperatures are similar to T_2.
At the lower boundary of the cooling wave the density of the
radiation is lower than the equilibrium density. Regardless
of the amplitude of the cooling wave always the lower
boundary of the cooling wave radiates, even at extremely
high temperatures. This conclusion follows from the steadyness
of the profile of the cooling wave. The second part of this
paper calculates the distribution of the temperature in the
cooling wave and the last part of this paper deals with
Card 2/4   the lower margin of the cooling wave and with the transition

On Air Cooling by Radiation   SOV/56-34-6-11/51

of the cooled air to the transparent zone. The processes
taking place in the cooled air zone are essentially
instationary and depend on the dimensions, on the hydrodynamic
motions, and on the additional mechanisms of light ab-
sorption. The authors then investigate the practically im-
portant case where the air pressure had not yet decreased
to the atmospheric pressure and where the air continues
to get cooler by radiation. The processes with adiabatic
cooling are quasistationary processes in the whole interesting
region. The point where the cooling of the air by radiation
ends may be considered as the lower boundary of the
cooling wave and the temperature in it - as the transparency
temperature for a given value A of the adiabatic cooling.
The transparency temperature depends only logarithmically
on A and on the amplitude of the cooling wave. The authors
thank N.N. Semenov for his stimulating discussions. There
are 5 figures and 2 references, 2 of which are Soviet.

Card 3/4
3

Zhur. Chem. Physics AS USSR

24(0)   SOV/56-35-6-13/44
AUTHORS: Zel'dovich, Ya. B.,   Rayzer, Yu. P.

TITLE: Physical Phenomena During the Expansion of Solid Bodies in a
              Vacuum, Which Were Compressed by Strong Shock Waves
              (Fizicheskiye yavleniya pri rasshirenii v vakuum tverdykh
              tel, szhatykh sil'nymi udarnymi volnami)

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, 1958,
              Vol 35, Nr 6, pp 1402-1406 (USSR)

ABSTRACT: A number of Soviet authors such as Al'tshuler, Krupnikov,
              Brazhnik, Ledenev, Zhuchikhin, Kormer, Sinitsyn, Kuryapin,
              as well as the authors of the present paper have already worked
              on this problem; very strong shock waves (amplitudes of the
              order of 10 million atmospheres, temperatures on the wave
              front of from 10 to 100000 degrees) and transparent solid bodies
              were investigated (Refs 1-3). In the present paper the authors
              carry out a theoretical investigation of optical and other
              physical properties shown by a nontransparent primarily solid
              body when expanding after being compressed by a strong shock
              wave. The hydrodynamics of the expansion process is at first
              discussed in short. The bright luminescence occurring on the
Card 1/3   front is then investigated. Absorption and emission of visible

SOV/56-35-6-13/44

Physical Phenomena During the Expansion of Solid Bodies in a Vacuum, Which Were Compressed by Strong Shock Waves

light in monoatomic gases (as e.g. metal vapor) occurs as a result of the photoeffect in highly excited atomic levels as well as in consequence of the inverse processes, i.e. of photorecombination. According to Boltzmann (Bol'tsman) it holds for the absorption process that

$\varkappa_\nu \sim \varrho \exp\left[-(I-h\nu)/kT\right]$, where I is the ionization potential.

For temperature, the approximated solution $T_{eff} = (I - h\nu)/k$ $\ln(tT^\beta_{eff}\cdot const)$ is given. (β is a constant of the order of some units). A numerical estimation for T_{eff} at $I \sim 5 + 8$ ev results in $3000 - 7000^\circ$ ($t \sim 10^{-10}$ sec). In the following, the condensation of the substance as well as the recombination of electrons and ions is dealt with. The authors do not mention further calculations or numerical results, but the problems are merely discussed. In conclusion, they express their gratitude to L. V. Al'tshuler and S. B. Kormer for discussions. A footnote draws the attention to the fact that in previous

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SOV/56-35-6-13/44

Physical Phenomena During the Expansion of Solid Bodies in a Vacuum, Which Were Compressed by Strong Shock Waves

works (Refs 4-6) the authors had carried out a theoretical investigation of the luminescence of gases, especially of air, in a shock wave. There are 9 references, 8 of which are Soviet.

SUBMITTED: July 11, 1958

Card 3/3

5(4), 2(5)   SOV/76-33-3-31/41

AUTHOR: Rayzer, Yu. P.

TITLE: Formation of Nitrogen Oxides in the Shock Wave of a Violent Ex-
                 plosion in the Air (Obrazovaniye okislov azota v udarnoy volne
                 pri sil'nom vzryve v vozdukhe)

PERIODICAL: Zhurnal fizicheskoy khimii, 1959, Vol 33, Nr 3, pp 700-709
                 (USSR)

ABSTRACT: The present paper deals with the explanation of optical phenomena
                 visible in heavy explosions at a temperature drop of about 7000°
                 to about 1000° (luminscence of the shock wave, the separation of
                 the shock-wave front from the fire-ball, the peculiar brightness
                 minimum of the fire-ball in the moment of explosion and the sub-
                 sequent burning). These optical phenomena have already been dis-
                 cussed (Ref 1). For this purpose the author investigated the re-
                 action kinetics and distribution of concentration of nitrogen
                 oxides within the explosion wave. A plot shows the distribution
                 of temperature, pressure and density within the explosion wave
                 (Fig 1). Further, the values of the internal energy ε and of the
                 exponent of the adiabatic curve γ (Ref 3) are given for some

Card 1/3   temperatures and pressures (Table 1). The equilibrium constant

SOV/76-33-3-31/41

Formation of Nitrogen Oxides in the Shock Wave of a Violent Explosion in the
Air

of NO and NO_2 in the air at 2000° - 5000° was computed as well
(Table 2). It results from the study of the reaction kinetics of
nitrogen oxidation that the time of relaxation τ_{NO} rapidly in-
creases with falling temperature (Table 3). The trajectories of
the shock-wave front and atmospheric particles are plotted
(Fig 2), the cooling curves of these particles within the ex-
plosion wave are shown (Fig 3), and a method is explained
whereby the kinetic equation for the adiabatic cooling of at-
mospheric particles within the explosion wave is solved. At
temperatures above 3000° the NO concentration in atmospheric
particles is in the equilibrium. No NO is formed by atmospheric
particles produced by explosion waves of a temperature below
2000°. A "chilling effect" is observed at a cooling from 3000°
to less than 2300°. A diagram of the characteristic distribu-
tion of NO behind an explosion wave below 2000° is contained
herein (Fig 4). τ'_{NO_2} and τ''_{NO_2}, the times of relaxation of NO_2

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Formation of Nitrogen Oxides in the Shock Wave of a Violent Explosion in the Air

SOV/76-33-3-31/41

(Table 4), indicate that $\tau'_{NO_2} > \tau''_{NO_2}$, i.e. the endothermic reaction $NO + O_2 = NO_2 + O$ rather than the exothermic reaction $2\,NO + O_2 = 2\,NO_2$ is the determinant factor above $2000°$. The reaction rate of the former was computed by the method of the "activated complex" (Ref 10). Above $2000°$ NO_2 and NO are in the equilibrium. In conclusion the author thanks D. I. Blokhintsev and Ya. B. Zel'dovich. There are 4 figures, 4 tables, and 10 references, 5 of which are Soviet.

SUBMITTED: September 5, 1957

Card 3/3

24(8)

AUTHOR: Rayzer, Yu. P.   SOV/56-36-5-53/76

TITLE: A Simple Method of Evaluating the Ionization Degree
             and the Thermodynamical Functions of an Ideal Gas
             Within the Range of Multiple Ionization (Prostoy
             motod otsenki stepeni ionizatsii i termodinamicheskikh
             funktsiy ideal'nogo gaza v oblasti mnogokratnoy ionizatsii)

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, 1959,
             Vol 36, Nr 5, pp 1583-1585 (USSR)

ABSTRACT: Calculation of the thermodynamical functions of a gas at
             very high temperatures, in the case of multiple ionization
             of atoms, is usually based on a calculation of ionization
             equilibrium; as, however, in this case a system of nonlinear
             algebraic equations must be solved for the ion concentration
             for each temperature-density pair of values, this entails
             a very considerable amount of computation work. Hitherto,
             Selivanov and Shlyapintokh (Ref 1) have carried out these
             calculations for the air in the temperature range between
             $2 \cdot 10^4$ and $5 \cdot 10^5$ °C and densities of 10 to 10^{-3} times the
Card 1/3   normal amount. The author of the present "Letter to the

A Simple Method of Evaluating the Ionization Degree   SOV/56-36-5-53/76
and the Thermodynamical Functions of an Ideal Gas
Within the Range of Multiple Ionization

        Editor" in the following gives several simple formulas
        which permit evaluation of quite satisfactory accuracy
        of the degree of ionization and the thermodynamical
        functions for any gas, which, for reasons of simplicity,
        is, however, to consist of atoms of one single element.
        Formulas are given for the degree of ionization, the
        internal energy ξ, pressure, and entropy (without derivation).
        For the purpose of illustrating the accuracy of the method,
        the author gives (in a table) the numerical values of ξ and

        $1 + \bar{n}$ calculated by him for air, compared with those
        obtained by Selivanov and Shlyapintokh. ($\bar{n} = N_e/N$, N = the
        number of atoms, and N_e - that of the electrons per cm^3).

        For the range investigated agreement is good. It is,
        however, also assumed that the air consists of the particles
        of one element. Thus, according to the data given by the

Card 2/3   table, the internal energy of air at 1.10^5 °C and

A Simple Method of Evaluating the Ionization Degree   SOV/56-36-5-53/76
and the Thermodynamical Functions of an Ideal Gas
Within the Range of Multiple Ionization

$\rho/\rho_{normal} = 10^{-2}$, 243 ev ; at 5.10^4 °C and $\rho/\rho_{normal} = 10^{-2}$,

83 ev, and at 3.10^4 °C, 33 ev. In the case of a relative
density of 10^{-1} the corresponding values for these 3
temperatures are: $\varepsilon = 186$, 58.5 and 21.6. The author
finally thanks Ya. B. Zel'dovich for his interest in this
investigation, and V. S. Imshennik for discussions. There
are 1 table and 2 Soviet references.

SUBMITTED: January 15, 1959

Card 3/3

21(8)

AUTHOR: Rayzer, Yu. P.

SOV/56-37-2-50/56

TITLE: On the Rest Ionization of a Gas Expanding in an Empty Space

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, 1959, Vol 37, Nr 2(8), pp 580-582 (USSR)

ABSTRACT: In a number of processes involving a rapid heating up to temperatures of the magnitude of 10,000 degrees, a gas cloud is produced, which propagates in the empty space (e.g. in the collision of a high-energy meteorite with the surface of a planet). If gas propagating has already reached an advanced stage, the average propagation rate u may be looked upon as being constant, and in the case of an adiabatic process, $u = \sqrt{2 \epsilon_0}$ may be put (ϵ_0 is the internal energy). The dimension of the gas cloud then is $r = ut$ and the mean density (atoms/cm^3) $n = n_0 (r_0/r)^3$ = $n_0 (t_0/t)$, $t_0 = r_0/u$ (r_0 and n_0 denote the initial dimension and -density). The gas is cooled adiabatically:

$$T = (Ae^{S/R})^{\gamma-1} n^{\gamma-1} t^{-3(\gamma-1)} \quad \text{(S is the specific entropy,}$$

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On the Rest Ionization of a Gas Expanding in an
Empty Space   SOV/56-37-2-50/56

A - a constant). Proceeding from these assumptions, the rest
ionization of the gas is then evaluated. Let x be the actual
and x_{eq} the ionization degree in equilibrium and $\alpha (x,n,T)$ - the
recombination coefficient, and $dx/dt = \alpha n \left[x_{eq}^2 - x^2 \right]$ will hold.
With some simplifying assumptions, the approximative formula
$\alpha_1 n_1 x_{eq1} t_1 = \frac{3}{2}(\gamma - 1)I/kT_1$ is then obtained for the moment of
time t_1 - and further $\alpha = \bar{v}_e \sigma_{ph} + x(n\bar{v}_e \sigma_e /BT^{3/2})I/kT.$
($\bar{v}_e$ is the electron velocity, σ_{ph} = const/T, - the photore-
combination cross section, σ_e the mean ionization cross section
through electrons, the energy of which is greater than I). The
numerical results of a practical example are given: the determi-
nation of the rest-ionization of iron vapor in the case of
primary heating to $116,000°$ (ε_o = 72 ev/atom,S = 61 cal/mol.degr,
u = 15.5 km/sec); if the radius r_o = 10 m (large iron meteorite)
Card 2/3   one obtains: $x_1 = 4.2 \cdot 10^{-3}$, $T_1 = 4550°$, $n_1 = 1.4 \cdot 10^{17} cm^{-3}$,

On the Rest Ionization of a Gas Expanding in an   SOV/56-37-2-50/56
Empty Space

and at high t-values, when a quasi-equilibrium has already been

established: $x_\infty = 2.1 \cdot 10^{-4}$. If r_0 = 1 cm (laboratory experi-

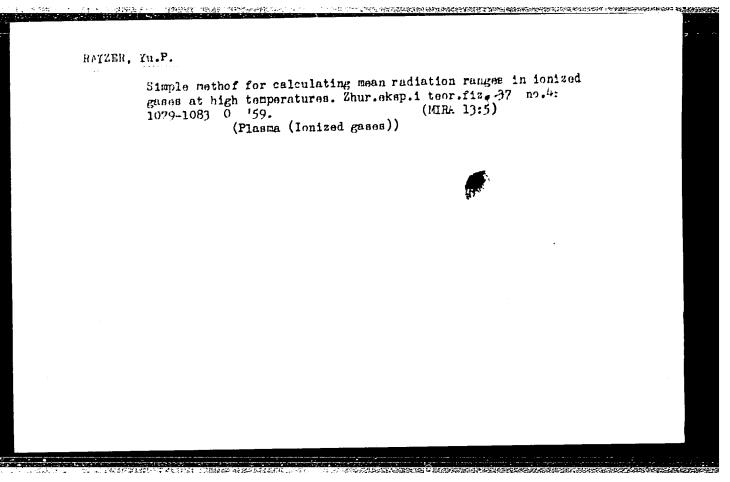ment) $x_\infty = 0.13$ is obtained. The author finally thanks

Ya. B. Zel'dovich for his interest and discussions. There are
2 Soviet references.

SUBMITTED: April 1, 1959

Card 3/3

RAYZER, Yu.P.

Simple methof for calculating mean radiation ranges in ionized gases at high temperatures. Zhur.eksp.i teor.fiz. 37 no.4: 1079-1083 O '59.   (MIRA 13:5)
                    (Plasma (Ionized gases))

16.8000, 24(8), 3(1), 16.8500

76990
SOV/56-37-6-30/55

AUTHOR: Rayzer, Yu. P.

TITLE: Condensation of a Cloud of Vaporous Matter Expanding Into
               a Vacuum

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, 1959,
               Vol 37, Nr 6, pp 1741-1750 (USSR)

ABSTRACT: A theoretical analysis was made of the kinetics of
               condensation of a cloud of vaporous matter expanding into
               vacuum. It was shown that, for a large variety of in-
               itial conditions, at infinity the matter expands
               partly as a gas and partly in the form of very small
               particles of the condensate. The number and size of
               these particles is dependent on the evaporated mass
               and on its initial temperature. It is suggested
               that when large meteorites strike the surface of
               planets without atmosphere, the ground of the latter
               and the meteorite may evaporate and subsequently con-
Card 1/2   dense. This process may be one of the sources of cosmic
               dense.

Condensation of a Cloud of Vaporous Matter   76990
Expanding Into a Vacuum   SOV/56-37-6-30/55

dust. The possibilities of laboratory investigation
of condensation of metallic vapors and of the properties
of the sublimate were discussed. This study was per-
formed under the guidance of Ya. B. Zel'dovich. There
are 9 references, 8 Soviet, 1 U.S. The U.S. reference
is: R. Latter, Phys. Rev., 99, 1854, 1955.

SUBMITTED: May 18, 1959

Card 2/2

RAYZER, Yu. P., ZEL'DOVICH, Ya. B.   (Moscow)

"On Radiation Generated by Strong Shock Waves."

report presented at the First All-Union Congress on Theoretical and Applied Mechanics, Moscow, 27 Jan - 3 Feb 1960.

RAYZER, Yu. P.   (Moscow)

"Some Phenomena of High Energy Collisions of Meteors with the Surface of Planets."

report presented at the First All-Union Congress on Theoretical and Applied Mechanics, Moscow, 27 Jan - 3 Feb 1960.

ACCESSION NR: AT4035832   S/2534/64/000/024/0082/0086

AUTHOR: Rayzer, Yu. P.

TITLE: Propagation of a shock wave in soil due to the impact of a high-velocity meteorite on the surface of a planet

SOURCE: AN SSSR. Komitet po meteoritam. Meteoritika, no. 24, 1964. Trudy* Desyatoy Meteoritnoy konferentsii v Leningrade 29 maya - 1 iyunya 1962 g., 82-86

TOPIC TAGS: meteorite, meteorite impact, hydrodynamics, meteorite explosion, meteorite crater, lunar crater theory

ABSTRACT: The impact of a meteorite against a planetary surface without atmosphere is considered in a two-dimensional approximation as a point explosion on the interface between empty space and ideal gas. The latter is used as a model of the impact-heated vaporized soil. Assuming meteorite velocity of the order of 10 km/sec, the relationship between shock-wave pressure and the affected mass is $p \sim M^{-n}$, where $1 < n < 2$. The determination of the numerical value of n

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ACCESSION NR: AT4035832

is based on a simple centered wave equation. The simplified results show that, in the case of concentrated impact, $n = 1.07$ when $\gamma = 1.205$, where γ is the adiabatic coefficient of expansion of the ideal gas around the impact point. It was further shown that only 1.6% of the total mass affected by the shock wave escapes backward through the crater mouth. The density of gas at the "bottom" of the crater was 10.3 ρ_0 (where ρ_0 is the density of ideal gas), which is nearly equal to the actual density at the front of the shock wave. It should be noted that in the one-dimensional case the index n monotonically decreases with an increase in γ. If the same applies to the two-dimensional case, which is very probable; then, for a concentrated impact, $1<n<1.07$ when $\gamma >1.205$. Since in real processes the values $\gamma<<1.205$ will hardly be of interest, the above range of values for n will be valid for any real value of γ. Orig. art. has: 6 formulas and 3 figures.

ASSOCIATION: none

Card 2/3

S/2534/64/000/024/0087/0090

ACCESSION NR.: AT4035833

AUTHOR: Rayzer, Yu. P.

TITLE: The condensation mechanism for the formation of cosmic dust

SOURCE: AN SSSR. Komitet po meteoritam. Meteoritika, no. 24, 1964. Trudy* Desyatoy Meteoritnoy konferentsii v Leningrade 29 maya - 1 iyunya 1962 g., 87-90

TOPIC TAGS: astrophysics, cosmic dust, asteroid, meteor, condensation

ABSTRACT: There are a number of mechanisms by which cosmic dust can be formed; this paper is limited to the postulated condensation method. In the event of collisions between asteroids, when the kinetic energy of the impact is sufficient for the total evaporation of both the colliding bodies, the effect of mechanical disintegration of matter is in general absent because the entire mass is evaporated. At the time of the falling of a very fast meteor on the surface of a planet there also is total evaporation of the meteor and a considerable mass of planetary material, a mass which can greatly exceed the mass of the meteor. These processes result in formation of a vapor cloud which expands in space. The reverse process of condensation of vapor during expansion and cooling leads to formation of small liquid droplets which soon harden as a result of loss of energy by radiation. The process described briefly in this paper — condensation in a cloud of vapor adi-

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ACCESSION NR.: AT4035833 .

abatically expanding in a vacuum — has been discussed quantitatively in an earli-
er paper (Yu. P. Rayzer, ZhETF, 37, 6(12), 1959). The author here cites the re-
sults obtained for a specific example; the problem considered is the condensation
of vapors of iron appearing as a result of evaporation of a large iron meteor with
a mass of 33,000 tons at the time of impact on the lunar surface. It is assumed
that the initial heating of the meteor body is 72 ev/atom and the velocity of
escape of the vapor into the vacuum is 15.5 km sec, of the same order of magni-
tude as the velocity of falling of the meteor. It is assumed that the force of
lunar attraction is absent and the vapors escape to "infinity". The iron vapor
becomes saturated at a time $6.8 \cdot 10^{-2}$ sec after commencement of escape, with ex-
pansion of the vapor cloud to 1,050 m in radius when the temperature of the vapor
is 2130° and the density is $7.15 \cdot 10^{16}$ atoms/cm^3. The condensation ceases when
the cloud has escaped to a distance of 40 km (after 2.5 sec). During this time
44% of the vapor has condensed; the other half escapes to infinity as atoms. The
particles of the condensate contain about 10^{10} atoms and have a radius of approx-
imately $3 \cdot 10^{-5}$ cm. The entire meteor has yielded $3 \cdot 10^{21}$ iron particles. Esti-
mates have shown that liquid droplets of condensate harden rapidly as a result of
loss of energy by radiation and escape into space as hard particles. Since in
nature there are collisions of bodies of very different dimensions it is poss-
ible for the particles of cosmic dust formed by the condensation process to be

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ACCESSION NR.: AT4035833

of very different dimensions. The process of condensation resulting from collision of stony meteors would be the same as for iron meteors. Orig. art. has: 2 formulas and 1 figure.

ASSOCIATION: Komitet po meteoritam, Akademiya nauk SSSR (Committee on Meteorites, Academy of Sciences, SSSR)

SUBMITTED: 00   DATE ACQ: 28May64   ENCL: 00

SUB CODE: AA   NO REF SOV: 002   OTHER: 000

5

Card 3/3

AM4026342   BOOK EXPLOITATION ·   S/

Zel'dovich, YAkov Borisovich; Rayzer, YUriy Petrovich

Physics of shock waves and high-temperature hydrodynamic phenomena
    (Fizika udarny*kh voln i vy*sokotemperaturny*kh gidrodinamiches-
    kikh yavleniy). Moscow, Fizmatgiz, 63. 0632 p. illus., biblio.
    4,000 copies printed.

TOPIC TAGS: gas dynamics, shock waves, heat transport, thermal ra-
diation, radiant heat exchange, thermodynamic properties of gas,
high temperature properties, shock tube, relaxation processes, shock
wave front, ionization, molecular gas, plasma, thermal waves, self-
similar processes

PURPOSE AND COVERAGE: This is claimed to be the first book in the
world literature devoted to a systematic analysis of many problems
on different branches of physics, physical chemistry, and astrophy-
sics in which modern gas dynamics and hydrodynamics are involved.

Card   1/4

AM4026342

It deals with the principles of gas dynamics and the theory of shock waves, the theory of radiative transfer, the thermodynamic and optical properties of matter at high temperatures and pressures, dissociation kinetics, ionization, and other nonequilibrium processes, as well as phenomena connected with the radiation of light and radiant heat exchange in shock waves and in explosions and problems involved in the propagation of shock waves in solids, etc. The book reflects the authors' many original papers in this field. The book will serve as a valuable practical text for many physicists, mechanics, specialists, engineers and undergraduate and graduate students specializing in applied physics and modern engineering, or those who wish to become acquainted with the present status of the science of shock waves.

TABLE OF CONTENTS [abridged]:

Card   2/4

AM4026342

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AM4026342

Literature - - 623

SUB CODE: PH   SUBMITTED: 09Oct63   NR REF SOV: 211

OTHER: 221   DATE ACQ: 19Mar64

Card   4/4

RAYZER, Yu.P. (Moskva)

Motion of a gas caused by a concentrated blow striking its
surface (in surface explosions). PMTF no.1:56-66 Ja-F '63.
(MIRA 16:2)

(Explosions)   (Gas dynamics)

RAYZER, Yu.P. (Moskva)

Retardation of and energy transformations in a plasma
expanding in a vacuum in the presence of a magnetic field.
PMTF no. 6:19-28 N-D '63.   (MIRA 17:7)

RAYZER, Yu.P.

Motion in an inhomogeneous atmosphere caused by a plane
impact of short duration. Dokl. AN SSSR 153 no.3:551-554
N '63.   (MIRA 17:1)

1. Predstavleno akademikom Ya. B. Zel'dovichem.

RAYZER, YU.P. (Moscow)

"The motion in non-homogeneous atmosphere caused by an impact of short duration".

Report presented at the 2nd All-Union Congress on Theoretical and Applied Mechanics, Moscow 29 Jan - 5 Feb 64.

S/0207/64/000/003/0162/0163

ACCESSION NR: AP4041208

AUTHOR: Rayzer, Yu. P.(Moscow)

TITLE: Observation on the dispersion of a gas cloud in a vacuum

SOURCE: Zhurnal prikladnoy mekhaniki i tekhnicheskoy fiziki, no. 3, 1964, 162-163

TOPIC TAGS: gas dispersion, particle collision surface, mean free path, gas particle, Gaussian distribution, density distribution, gas dynamics, Maxwell distribution

ABSTRACT: The author stated that gas particles in a spherically symmetric, free molecular dispersion have a Maxwellian velocity distribution only if certain conditions are met. These conditions rarely exist in cases of practical interest. In actual conditions the dispersion of a gas cloud begins (for small mean free path) with a gas dynamic stage, and the uncomplicated free molecular movement stage is not reached for a time. The case of the adiabatic expansion of a highly heated dense gas was treated. In this case the mean mass speed of diffusion u was hypothesized to be approximately equal to $\sqrt{2 E_o/M}$, where E_o is the initial total internal energy and M is the mass; the radius of the gaseous sphere was

Card 1/2

S/0207/64/000/004/0049/0056

ACCESSION NR: AP4044720

AUTHOR: Rayzer, Yu. P. (Moscow)

TITLE: Shock wave propagation in a nonuniform atmosphere towards the area of decreasing density

SOURCE: Zhurnal prikladnoy mekhaniki i tekhnicheskoy fiziki, no. 4, 1964, 4?-56

TOPIC TAGS: shock wave, shock wave propagation, atmosphere shock wave, explosion, similarity solution, vacuum gas flow

ABSTRACT: A similarity solution is presented for the problem of a plane shock wave propagating through a nonuniform medium of variable density which may be approximated by an exponential function

$$\rho_0 = [\rho]e^{x/\Delta}$$

where Δ = constant. It is assumed that the shock propagates in the direction of density decrease, though the effect of gravity is neglected. The equation of motion of a shock wave reaching the boundary

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ACCESSION NR: AP4044720

of the atmosphere $x = -\infty$, $\rho_o = 0$ at time $t = 0$ is derived. A sim-
ilarity solution is also considered for the motion of a gas expanding
into the vacuum at $t > 0$. Numerical calculations were made for the
adiabatic exponent $\gamma = 1.2$ and $\gamma = 5/3$. The distributions of density,
pressure and velocity are given in graphs. The solutions obtained are
used to describe the flow field in the upper region above an explosion
in a nonuniform atmosphere. It is pointed out that in principle the
air accelerated upward to a high velocity by the shock wave should escape
the earth's gravitational field and "splash" into the vacuum, but that
because of strong ionization the upward motion is limited by the re-
tardation effect of the earth's magnetic field. Orig. art. has:
2 figures and 24 formulas.

ASSOCIATION: none

SUBMITTED: 19Mar64   ATD PRESS: 3093   ENCL: 00

SUB CODE: ME   NO REF SOV: 007   OTHER: 001

Card 2/2

L 27203-65   EWT(1)/EPA(w)-2/EEC(t)   Pab-10   S/0207/64/000/005/0149/0151
ACCESSION NR: AP5002879

AUTHOR: Rayzer, Yu. P. (Moscow)

TITLE: Retardation radiation of electrons during scattering by neutral atoms, taking into account the collisional correlations

SOURCE: Zhurnal prikladnoy mekhaniki i tekhnicheskoy fiziki, no. 5, 1964, 149-151

TOPIC TAGS: radiation energy, electron, correlation, frequency, Fourier analysis

ABSTRACT: A formula for the radiation power, containing the frequency factor, is derived by the direct consideration of the retardation radiation of electrons during collisions with neutral atoms and by taking into account the correlations between the collisions. In classical electrodynamics an electron undergoing accelerated motion radiates an amount of energy in the interval ω to $\omega + d\omega$, given by

$$dE_\omega = \frac{8\pi e^2}{3c^3} |w_\omega|^2 \, d\omega \quad ,$$

where w_ω is the Fourier component of the acceleration. Using Kirchoff's law,

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L 27203-65

ACCESSION NR: AP5002879

G. Bekefi, I. L. Hirshfield, and S. C Brown (Zakon Kirkhgofa dlya plazmy s nemaksvellovskim raspredeleniyem. Phys. Fluids, 1961, v. 4, No. 2, p. 173) obtained the following expression for the radiation power:

$$dQ_\omega = \frac{4}{3\pi} \frac{e^2 v^2 \nu_{eff}}{c^2} \frac{\omega^2}{\omega^2 + \nu_{eff}^2} d\omega$$

The present author expresses w(t) directly in the form

$$w(t) = \sum_{k=1}^{N} \Delta v_k \delta(t_k) \quad ,$$

and derives an expression for $\langle |w_\omega^2| \rangle$:

$$\langle |w_\omega|^2 \rangle = \frac{1}{4\pi^2} N \left\{ 2v^2(1-\mu) - 2v^2(1-\mu)\frac{\nu_{eff}^2}{\omega^2 + \nu_{eff}^2} \right\} \quad .$$

In these formulas t_k is the instant of the k-th collision, and Δv_k is the corresponding change in the velocity. Also $\nu_{eff} = (1 - \mu)\nu$. The author acknowledges his sincere appreciation to Ya. B. Zel'dovich for noticing the

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L 27203-65
ACCESSION NR: AP5002879

effect of the correlations. Orig. art. has: 12 formulas.

ASSOCIATION: none

SUBMITTED: 22Apr64   ENCL: 00   SUB CODE: EM

NO REF SOV: 002   OTHER: 001

Card 3/3

L 1C407-65   EWG(j)/EWA(k)/FBD/EWT(1)/EPF(c)/EEC(k)-2/T/EEC(t)/EPA(w)-2/EWP(k)/
EEC(b)-2/EWA(h)/EWA(m)-2   Pn-4/Po-4/Pab-24/Pf-4/Pr-4/Peb/Pi-4/Pl-4   IJP(c)/SSD/
ASD(d)/ASD(a)-5/BSD/AFWL/AFETR/ESD(gs)/RAEM(a)/ESD(t)/RAEM(t)   WG/WW

ACCESSION NR: AP4046437   S/0056/64/047/003/1150/1161

AUTHOR: Zel'dovich, Ya. B.; Rayzer, Yu. P.

TITLE: Cascade ionization of a gas by a light pulse   B

SOURCE: Zhurnal eksperimental'noy i teoreticheskoy fiziki, v. 47,
no. 3, 1964, 1150-1161

TOPIC TAGS: laser, electrical breakdown, cascade ionization, field
ionization, gas breakdown

ABSTRACT: The mechanism responsible for the ionization of a gas by
means of a light pulse (from a laser) at an optical-frequency electric-
field strength of about 10^6—10^7 v/cm and at pressures exceeding 1
atm is investigated theoretically. The case considered is limited to
low pulse power, at which the light-induced emission of electrons is
not too important. Under these conditions ionization is a cascade
process, and the standard cascade theory for gas breakdown at micro-
wave frequencies is applicable; the electrons obtain energy from the
field through electron-atom collisions. Approximate calculations of

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L 10407-65

ACCESSION NR: AP4046437

the development of the cascade are carried out using a kinetic equation of the distribution function for electrons describing the interaction of free electrons with the field. Theroetically calculated values values for the electric-field strength required to produce a breakdown in argon and helium were found to agree with the experimental data. Orig. art. has: 2 tables, 2 figures, and 22 formulas.

ASSOCIATION: none

SUBMITTED: 20Apr64   ATD PRESS: 3119   ENCL: 00

SUB CODE: OP, EC   NO REF SOV: 007   OTHER: 002

Card   2/2

L 2124-66   EWT(1)/ETC/EPF(n)-2/EWG(m)/EPA(w)-2 - IJP(c)   AT

ACCESSION NR: AP5021900   UR/0207/65/000/004/0010/0020

AUTHOR: Kuznetsov, N. M. (Moscow); Rayzer, Yu. P. (Moscow)

TITLE: Electron recombination in a plasma expanding in vacuum

SOURCE: Zhurnal prikladnoy mekhaniki i tekhnicheskoy fiziki, no. 4, 1965, 10-20

TOPIC TAGS: plasma, ionization, recombination, ionization degree, recombination coefficient, triple collision

ABSTRACT: In an earlier theoretical work by one of the authors (Rayzer, Yu. P.   On the residual ionization of a gas expanding in vacuum. ZhETF, 37, 2, 1959, 580), photorecombination and 3-body recombination processes occurring in a gas cloud expanding in vacuum were briefly investigated.   This study is now extended and reviewed in the light of theoretical and experimental data recently published in the Soviet Union and in the West.   It is shown that, contrary to the findings of the earlier work, if the expanding gas cools rapidly, recombination does not stop, but diminishes infinitely.   Because the cooling of the

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L 2124-66
ACCESSION NR: AP5021900 O

gas is in turn an effect of heat liberation during recombination, the
process must be described by a system of equations in which kinetics
and energy are related to unknown time functions. The comparison of
photorecombination coefficients and recombinations due to triple
collisions indicates that at excessively small electron densities, the
latter collisions prevail. From then on neither photorecombination
nor triple collisions (with atoms being the third particles) play any
part. When the deactivation of a highly excited atom takes place
rapidly when compared to the speed of the change of electron density
and temperature,the recombination energy is liberated immediately
after the electron capture by the ion. Only this part of the recom-
bination energy turns into heat, which is transferred to the electrons
during the deactivation of excited atoms by second-kind collisions. If
the gas is transparent, the remaining part is almost completely lost.
Orig. art. has: 25 formulas and 2 figures.   [ZL]

ASSOCIATION: none

SUBMITTED: 11May65   ENCL: 00   SUB CODE: NP,ME

NO REF SOV: 006   OTHER: 004   ATD PRESS: 4117
Card 2/2

ALEKSANDROV, S.A.; KLENOV, V.B.; BAYZER, Yu.F.

Studying the hydrodynamic characteristics of bobbins as radial
filters. Izv. vys. ucheb. zav.; tekh. teks. prom. no.6:105-110
'65.   (MIRA 19:1)

1. Odesskiy tekhnologicheskiy institut imeni M.V. Lomonosova.
Submitted September 20, 1965.

L 47752-65   EWT(1)/EEC(t)

UR/0056/65/048/005/1508/1519

ACCESSION NR: AP5013911

AUTHOR: Rayzer, Yu. P.

TITLE: Heating of a gas by high-intensity light pulse

SOURCE: Zhurnal eksperimental'noy i teoreticheskoy fiziki, v. 48, no. 5, 1965, 1508-1519

TOPIC TAGS: thermal wave, absorption wave, shock wave, gas heating, radiation heating, detonation, superdetonation, shock ionization, gas breakdown

ABSTRACT: Absorption of a high-intensity light pulse after an initial breakdown at a focus (the narrowest point of a light tube where light flux is maximum) is considered. A theoretical study is made of three mechanisms which independently may cause absorption: 1) the hydrodynamic mechanism, 2) the "breakdown" mechanism, and 3) the radiation mechanism. The first can be likened to the mechanism which governs the detonation of explosives. The heated gas in an absorbing medium expands and generates a shock wave in all directions, including the one along a light tube toward the oncoming light pulse. The gas in the shock wave is heated and ionized, causing absorption and emission of energy behind the front of the shock wave. In the second mechanism, a high-intensity beam hits a cold gas, causing electron avalanche. If

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ACCESSION NR: AP5013911

the light pulse at a focus noticeably exceeds the breakdown threshold, the pulse
becomes super-threshold and a breakdown wave expands in the direction of the light
beam.   In the third mechanism, a gas in front of an absorbing layer becomes ionized
and capable of absorbing light emitted, as the result of the absorption of thermal
radiation emanating from the high-temperature region of the gas. The effectiveness
of each mechanism is characterized by the velocity with which it can propagate the
absorption wave. The wave velocities were calculated and a general form of the
"shock adiabate" of the light-absorbing substance was plotted. A general relation
between the wave velocity and the heating temperature was derived on the basis of
the laws of the conservation of energy. The first and third mechanisms generated
waves with identical velocities and were more effective than the second mechanism.
Orig. art. has: 6 figures and 27 formulas.   [YK]

ASSOCIATION: none

SUBMITTED: 25Dec64

NO REF SOV: 010

ENCL: 00   SUB CODE: ME, OP

OTHER: 009   ATD PRESS : 4004

Card 2/2

L 62764-65   EWA(k)/FBD/EWG(r)/EWT(1)/EEC(k)-2/T/EEC(b)-2/EWP(k)/EWA(m)-2/EWA(h)
Pm-4/Pn-4/Po-4/Pf-4/Peb/Pi-4/Pl-4   SCTB/IJP(c)   WG

ACCESSION NR: AP5019225   UR/0056/65/049/001/0127/0134

AUTHOR: Mandel'shtam, S. L.; Pashinin, P. P.; Prokhorov, A. M.; Rayzer, Yu. P.;
Sukhodrev, N. K.

TITLE: Investigation of a spark in the air due to a focused laser beam. II

SOURCE: Zhurnal eksperimental'noy i teoreticheskoy fiziki, v. 49, no. 1, 1965,
127-134

TOPIC TAGS: gas breakdown, air breakdown, plasma heating, Doppler shift, laser
beam scattering

ABSTRACT: This article is a continuation of an earlier work (S. L. Mandel'shtam,
P. P. Pashinin, A. V. Prokhindeyev, A. M. Prokhorov, and N. K. Sukhodrev, ZhETF,
47, 2003, 1964), and presents the results of an experimental investigation of the
initial shape of the laser-induced air breakdown. A 2—2.5-j ruby laser with a Q-
switch (40 nanosecond duration) was used. The plasma temperature produced in the
focal region was determined on the basis of the recombination radiation spectrum
in the soft x-ray range ($\lambda \simeq 10\ \text{Å}$) and was found to be 50—60 ev. The measurements
were made by means of photon counters with aluminum and beryllium windows 3 and
8 mm in diameter, respectively. A study of laser emission scattered on plasma in-

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L 62764-65

ACCESSION NR: AP5019225   /

dicated that the ionization front moves toward the focusing lens with a velocity
of $\sim 10^7$ cm/sec measured on the basis of the Doppler shift of the scattered light.
The motion of the ionized region under these conditions can be explained in terms of
three mechanisms: 1) the hydrodynamic mechanism, 2) the light mechanism, and 3) the
successive breakdown mechanism. All three mechanisms were fully discussed by Rayzer
in an earlier article (ZhETF, 48, 1508, 1965). Under the experimental conditions
in this work, the first mechanism is considered the most probable. Values for the
velocity of the detonation wave front (105 and 133 km/sec) and the plasma tempera-
ture behind the plasma ($\sim 910.10^3$ and 720.10^7K), respectively, estimated on the basis
of this mechanism are in satisfactory agreement with the experimental data. Orig.
art. has: 1 table, 5 figures, and 7 formulas.   [YK]

ASSOCIATION: Fizicheskiy institut im. P. N. Lebedeva AN SSSR (Physics
Institute, AN SSSR)

SUBMITTED: 19Feb65   ENCL: 00   SUB CODE: EC,ME

NO REF SOV: 009   OTHER: 010   ATD PRESS: 4055

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L 1775-66   EWA(k)/FBD/EWT(1)/EEC(k)-2/T/EWP(k)/EWA(m)-2/EWA(h)   SCTB/IJP(c)   WG
ACCESSION NR: AP5024197   UR/0053/65/087/001/0029/0064
                                                   537.56

AUTHOR: Rayzer, Yu. P.

TITLE: Breakdown and heating of gas by a laser beam

SOURCE: Uspekhi fizicheskikh nauk, v. 87, no. 1, 1965, 29-64

TOPIC TAGS: laser, laser beam, breakdown, nonlinear optics, multiphoton effect

ABSTRACT: A review is made of the heating and breakdown of gases by a focused
laser beam. The review is divided into two sections, the first dealing with the
breakdown effect, i.e., the formation of ionization in the focal region and formation
of the primary plasma, and the second, with the absorption of the laser beam by
the plasma, heating of the gas, and effects observed after the passage of the
laser beam. An experimental investigation of the effect of a giant pulse on
solid targets and an evaluation of the possibility of heating hydrogen gas to
the temperatures required for thermonuclear reaction are discussed. Each section
begins with a summary of the experimental data, which is followed by a theoretical
treatment of the mechanism responsible for the effect. The section entitled
"the breakdown of gases" is subdivided as follows: 1) measurement of the threshold

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ACCESSION NR: AP5024197

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parameters; 2) multiphoton effect; 3) avalanche ionization (qualitative treatment);
4) increase in the electron energy in the field of radiation; and 5) calculation
of the avalanche ionization. The second section, entitled "Absorption of the
beam and heating of the gas," consists of the following subdivisions: 1) measure-
ment of absorption and scattering of the laser beam and heating of the gas in
the breakdown region; 2) light absorption and gas heating waves; 3) breakdown
and radiation mechanisms; 4) the spark as a strong explosion. The spark in a
magnetic field; 5) generation of plasma by a solid target; and 6) conditions
required for a high degree of heating of hydrogen. The review is based on 61
references, 28 of which are Soviet. Orig. art. has: 23 formulas and 13 figures.

[CS]

ASSOCIATION: none

SUBMITTED: 00   ENCL: 00

                                                            SUB CODE: EC,ME

NO REF SOV: 030   OTHER: 031

                                                            ATD PRESS: 4111

Card 2/2

L 20683-66   EWT(1)   IJP(c)   WW/GG

ACC NR: AP6008741   SOURCE CODE: UR/0386/66/003/003/0137/0141

AUTHOR: Zel'dovich, Ya. B.; Rayzer, Yu. P.

ORG: Institute of the Problems of Mechanics (Institut problem mekhaniki)

TITLE: Self-trapping of light. Importance of the Kerr effect and the striction

SOURCE: Zhurnal eksperimental'noy i teoreticheskoy fiziki. Pis'ma v redaktsiyu.
Prilozheniya, v. 3, no. 3, 1966, 137-141

TOPIC TAGS: self trapping, laser, Kerr effect, electrostriction, dielectric constant

ABSTRACT: The authors consider self-trapping in order to determine whether the Kerr
effect or electrostriction is responsible for self-trapping. Theoretical analysis
shows that in anisotropic gases and liquids the minimum energy required for self-
trapping should be four times greater for circularly polarized than for linearly
polarized light if the Kerr effect is responsible for self-trapping. In the case of
electrostriction the minimum energy should be the same for the two types of polariza-
tion. It is pointed out that in certain crystalline substances such as diamond and
MgO the index of refraction decreases with pressure. In such materials a change in
density caused by the field leads to self-trapping; however, broadening rather than
narrowing will occur. An approximate calculation based on the diffraction of the
beam shows that the linear velocity at which the self-trapping channel is propagated
is greater in the case of the Kerr effect ($\sim 10^7 - 10^8$ cm/sec) than it is for

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ACC NR: AP6008741   𝒪

electrostriction ($\sim 10^5$ cm/sec). The experimentally observed relatively long channels
formed by short pulses apparently indicate that the Kerr effect is primarily responsi-
ble for self-trapping. This, however, does not exclude the effect of electrostric-
tion, which may be responsible for self-trapping in a zone of the channel propagated
a certain distance behind the primary trapping zone. It is also pointed out that the
light observed at the end of the channel changes frequency, i.e., a Doppler effect
which depends on the linear velocity and the index of refraction should be observed.
                                                                        [CS]

SUB CODE: 20/ SUBM DATE: 20Dec65/ ORIG REF: 003/ OTH REF: 002/ ATD PRESS:
                                                                         4223

Card 2/2 BK

L 35877-66   FBD/EWT(1)/EEC(k)-2/T/EWP(k)   IJP(c)   AG

ACC NR: AP6023631   SOURCE CODE: UR/0386/66/004/001/0003/0007

AUTHOR: Rayzer, Yu. P.

ORG: Institute of Mechanics Problems, Academy of Sciences SSSR (Institut problem mekhaniki Akademii nauk SSSR)

TITLE: Stratification of light beams in a nonlinear medium and the real threshold for self-focusing

SOURCE: Zhurnal eksperimental'noy i teoreticheskoy fiziki. Pis'ma v redaktsiyu. Prilozheniye, v. 4, no. 1, 1966, 3-7

TOPIC TAGS: laser beam, laser r and d, laser optics

ABSTRACT: The author analyzes the self-focusing of laser beams having a real divergence, explains the causes of the stratification and self-channeling (self-trapping) of the beam, and estimates the fraction of the energy that can enter the channel and the threshold power of the laser. The calculations are based on the equations of quasi-optics for stationary paraxial rays and yield the limiting value of the initial angle of the beam rays participating in the self-channeling. The threshold power of the laser turns out to be much higher than the critical power. For example, for a beam of radius 0.4 cm and a divergence 2.5×10^{-3} the threshold power is 138 times the critical power whereas the maximum power is 35 times threshold. When the power is approximately equal to the threshold value, approximately 3% of the power is self-trapped. The results agree in order of magnitude with published experimental data.

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ACC NR: AP6023631

The formulas derived for the threshold, self-trapping, and maximum power are valid for both focused and unfocused laser beams. If the light from the end surface of the laser rod is not uniform, more than one channel may be produced. Orig. art. has: 1 figure and 7 formulas.   [02]

SUB CODE: 20/   SUBM DATE: 20Apr66/   ORIG REF: 006/   OTH REF: 003/
ATD PRESS: 5037

Card 2/2

L 45817-66   EWT(1)   IJP(c)   WW/GG

ACC NR: AP6031581   SOURCE CODE: UR/0386/66/004/004/0124/0128

AUTHOR: Rayzer, Yu. P.

ORG: Institute of Mechanics Problems, Academy of Sciences SSSR (Institut problem mekhaniki Akademii nauk SSSR)

TITLE: Self-focusing of a homogeneous light beam in a transparent medium, due to weak absorption

SOURCE: Zhurnal eksperimental'noy i teoreticheskoy fiziki. Pis'ma v redaktsiyu. Prilozheniye, v. 4, no. 4, 1966, 124-128

TOPIC TAGS: light absorption, self trapping, electrostriction, thermal effect

ABSTRACT: The author shows that when a homogeneous light beam is absorbed, nonstationary motion of the substance, due to heat release, leads to such a density distribution that, in contrast with the usual influence of heating, a tendency arises toward self-focusing of the beam. The analysis consists of determining the change in density of the medium in the light channel under the joint influence of the increase in pressure resulting from heat release without a change in density and the striction pressure and the effect of the compression and rarefaction waves that travel as a result in the medium at the speed of sound. A criterion for the weakness of the absorption is derived. The time when the thermal effect begins to exceed the electrostriction effect is estimated. A numerical example is presented for a parallel homogeneous beam obtained by placing in the path of a laser beam a screen with a

Card   1/2

L 45817-66
ACC NR: AP6031581   2

small opening in the center. The results show that self focusing by absorption
stabilizes a plane wave with large supercritical power propagating in a medium,
because after the passage of a time sufficient for the thermal effect to exceed
electrostriction, the thermal effect will suppress the spontaneously arising in-
stability. The author thanks L. A. Askar'yan and Ya. B. Zel'dovich for valuable
discussions. Orig. art. has: 2 figures and 5 formulas.   [02]

SUB CODE: 20/   SUBM DATE: 30May66/   ORIG REF: 003/   OTH REF: 001/ ATD PRESS:
5083

LK
Card   2/2

ACC NR₁ AP6018343

SOURCE CODE: GE/0036/66/006/001/0001/0008

AUTHOR: Mandel'shtam, S. L.; Pashinin, P. P.; Prokhorov, A. M.; Rayzer, Yu. P.; Sukhodrev, N. K.

ORG: Physics Institute im. P. N. Lebedev, AN SSSR, Moscow (Fizicheskiy Institut AN SSSR)

TITLE: Investigation of a spark in air formed during focusing of emission from a laser

SOURCE: Beitrage aus der Plasma Physik, v. 6, no. 1, 1966, 1-8

TOPIC TAGS: ~~laser, nonlinear optics, air breakdown~~ laser emission, plasma decay, laser beam, ruby laser, plasma temperature, line shift, Doppler shift

ABSTRACT: An experimental investigation was conducted of air breakdown produced by a Q-switched ruby laser (pulse energy 2—2.5 j, pulse duration 30 μsec). The authors analyzed the last two stages of the breakdown process, which according to them can be subdivided into the following three stages: 1) the breakdown stage (rapid increase in the number of free electrons); 2) the quasi-stationary stage (dense plasma is maintained by the absorption of energy of the laser beam); and 3) the afterglow sta.→ (decay of plasma after the laser pulse ceases). From the soft x-ray emission of the plasma (at about 10 Å) due to continuous recombination of N^{5+}, N^{6+}, N^{7+}, O^{6+}, O^{7+}, O^{8+} the maximum electronic temperature of the plasma in the breakdown region was determined to be ≈ 60 ev. The width of the laser line scattered by the plasma during the second stage was determined to be ≈ 1—1.4 Å; the shifting of the line was found to vary at different positions near the focal region of the laser beam with the maximum shift

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Card   2/2   ひ ひ

L 03776-67   E/T(1)/FCC   GW

ACC NR: AP6028337   SOURCE CODE: UR/0293/66/004/004/0574/0580

AUTHOR: Kozlov, S. I.; Rayzer, Yu. P.

33

B

ORG: none

TITLE: Evaluation of the coefficient of dissociative recombination in the lower ionosphere

SOURCE: Kosmicheskiye issledovaniya, v. 4, no. 4, 1966, 574-580

TOPIC TAGS: electron concentration, dissociative recombination, ~~~~~~~~~, chromospheric flare, x radiation, *nuclear explosion*

ABSTRACT: The coefficient of dissociative recombination at altitudes up to $\sim$100 km is calculated using Western rheometer data on ionospheric absorption obtained during the high-altitude nuclear explosion of 9 July 1962. The calculations performed differ from those of R. E. Le Levier (Journal of Geophysical Research, v. 69, no. 3, 1964, p. 481) in that the important process of ionization of the atmosphere by γ-radiation of fission products is taken into account.   It is shown that at altitudes up to $\sim$ 100 km, the coefficients of dissociative recombination should be within the limits of $\sim$ 5.5—8 x 10^{-7} cm^3/sec.   Orig. art. has: 5 figures, 3 tables, and 4 formulas.
[EG]

SUB CODE: 04/ SUBM DATE: 10Dec65/ ORIG REF: 006/ OTH REF: 008/ ATD PRESS: *5062*

Card 1/1   UDC: 551.510.535

L 04607-67   EWT(1)   IJP(c)   WW/GG

ACC NR: AP6034419   SOURCE CODE: UR/0386/66/004/008/0286/0290

AUTHOR: Rayzer, Yu. P.

ORG: Institute of Mechanics Problems, Academy of Sciences SSSR (Institut problem mekhaniki Akademii nauk SSSR)

TITLE: Suppression of self-focusing of light beams and stabilization of a plane wave in a weakly absorbing medium

SOURCE: Zhurnal eksperimental'noy i teoreticheskoy fiziki. Pis'ma v redaktsiyu. Prilozheniye, v. 4, no. 8, 1966, 286-290

TOPIC TAGS: light transmission, self focusing, Kerr effect, electrostriction, heat absorption

ABSTRACT: It is shown that the presence of weak absorption in a nonlinear transparent medium with a dielectric constant that depends on the electric field affects strongly the time evolution of the processes of self-focusing and decay of the plane wave. Slight heating of the medium, which accompanies the absorption, leads to thermal expansion and to occurrence of a negative dielectric-constant increment $\delta\epsilon_{th}$. Whereas the Kerr effect and electrostriction, which produce positive increments, give rise to self-focusing of the light beam, the absorption exerts a defocusing action. Owing to the constant increase in $|\delta\epsilon_{th}|$ with time (as heat is being released), the self-focusing effect must be suppressed after a certain time. Absorption, consequently, exerts a stabilizing effect, suppressing each case of instability flareup after the

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L 04607-67

ACC NR: AP6034419 O

lapse of sufficient time, rectifying the beams and equalizing in the transverse direc-
tion the field between the individual self-focusing beams. The author calculates and
compares the dielectric-constant increments due to the Kerr effect, electrostriction,
and heat absorption, and presents numerical estimates. Orig. art. has: 5 formulas.

SUB CODE: 20/   SUBM DATE: 12Jul66/   ORIG REF: 003/   OTH REF: 001/

ATD PRESS: 5100

Card 2/2

ACC NR: AM6029398   Monograph   UR/

Zel'dovich, YAkov Borisovich; Rayzer, YUriy Petrovich

Physics of shock waves and high-temperature hydrodynamic phenomena
   (Fizika udarnykh voln i vysokotemperaturnykh gidrodinamicheskikh
   yavleniy) 2d ed., rev. Moscow, Izd-vo "Nauka," 1966. 686 p. illus.,
   biblio. 7500 copies printed.

TOPIC TAGS: gas dynamics, shock wave analysis, laser thermal wave, high
   temperature physics

PURPOSE AND COVERAGE: A great variety of problems from various fields
   of physics, physical chemistry, and astrophysics which involve modern
   gas dynamics and hydrodynamics are discussed in this book (second
   edition). It deals with the principles of gas dynamics and the
   theory of shock waves, and the theory of transport of radiation.
   Among the subjects considered are: the thermodynamic and optical
   properties of substances subjected to high temperatures and pres-
   sures; the kinetics of dissociation, ionization, and other non-
   equilibrium processes; phenomena connected with the radiation of
   light and radiative heat exchange in shock waves and explosions. The
   authors of this monograph have written a large number of original
   articles in this field of science which have been reflected in the
   book. Although the general plan and a large part of the text of the

Card 1/4   UDC: 541.12

ACC NR: AM6029398

second edition have remained unchanged from the first edition, some
chapters have been revised and supplemented. A special section
devoted to a semiclassical treatment of induced radiation and the
laser effect was added to Chapter 2. A section on breakdown
processes and heating of gases under a focused laser beam was added
to Chapter 5; sections on the emission and absorption of light by
free electrons in collisions with neutral atoms were also added to
this chapter. Section 3 of Chapter 6 dealing with problems of
ionization, recombination, and electron excitation were rewritten
and supplemented to correspond with present-day views on the
importance of ionization of atoms in stages and electron capture in
ternary collisions on the upper energy levels of atoms; the ioniza-
tion of air is considered in more detail than formerly. The dis-
cussion of gas ionization in shock waves in Chapter 7 was revised as
were sections of Chapter 8 on the kinetics of changes in the degree
of ionization and the "quenching" of an escaping ionized gas. A
special section on the propagation of shock waves in an inhomo-
geneous gas with exponential distribution of density was added to
Chapter 11. An appendix giving some constants, relationships between
atomic constants, and relationships between units and formulas often
encountered in practical work in the field was added to this edition.
This book is intended as a practical aid to physicists, specialists
in mechanics, and engineers working in applied physics and new fields

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ACC NR: AM6029398

of technology. It should be useful to graduate students and students in the appropriate specialties, also to physicists who wish to familiarize themselves with the present state-of-the-art of the science of shock waves.

TABLE OF CONTENTS [abridged]:

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ACC NR: AM6029398

Ch. 11.   Shock waves in solids -- 536
Ch. 12.   Some self-similar processes in gas dynamics -- 610
Appendix -- 672
Bibliography -- 675

SUB CODE: 20/   SUBM DATE: 26Feb66/   ORIG REF: 277/   OTH REF: 259

Card 4/4

RAY MAH, A. M. (Engineer)

Quench-Hardened and Improved Spline Joints.

Povsheniye iznosostoykosti i sroka sluzhby mashin. t. 2 (Increasing the Wear Resistance and Extending the Service Life of Machines. v. 2) Diyev, Izd-vo AN UkrSSr, 1960. 290 p. 3,000 copies printed. (Series: Its: Trudy, t.2)

Sponsoring Agency: Vsesoyuznoye nauchno-tekhnicheskoye obshchestvo mashinostroitel' noy promyshlennosti. Tsentral'noye i Kiyevskoye oblastnoye pravleniya. Institut mekhaniki AN UkrSSR.

Editorial Board: Resp. Ed.: B. D. Grozin; Deputy Resp. Ed.: D. A. Draygor; M. P. Braun, I. D. Faynerman, I. V. Kragel 'skiy; Scientific Secretary: M. L. Barabash; Ed. of v. 2: Ya. A. Samokhvalov: Tech. Ed.: N. P. Rakhlina.

COVERAGE: The collection contains papers presented at the Third Scientific Technical Conference held in Kiyev in September 1957 on problems of increasing the wear resistance and extending the service life of machines. The conference was sponsored by the Institut stroitel'noy mekhaniki AN UkrSSR (Institute of Structural Mechanics of the Academy of Sciences Ukrainian SSR), and by the Kiyevskaya oblastnaya organizatsiya nauchno-tekhnicheskogo obshchestva mashinostroitel noy promyshlennosti (Keyev Regional Organization of the Scientific Technical Society of the Machine-Building Industry).

RAYZMAN, A. YE.

Concrete Construction

Architectural details from decorative concrete. Biul. stroi. tekh., 9, No. 16, 1952

BALASHOVA, Anna Yegorovna; BALYAVICHENE, Stase Prano; GAVRILOVICH, Lyubov'
    Grigor'yevna; RAYZMAN, F.B., redaktor; DOBRYNINA, A.Ya., redaktor;
    LEDNEVA, N.V., tekhnicheskiy redaktor.

[Our experience in handling long-distance telephone calls] Nash opyt
obsluzhivaniia abonentov mezhdugorodnoi telefonnoi stantsii. Moskva,
Gos.izd-vo lit-ry po voprosam sviazi i radio, 1955. 15 p.[Microfilm]
(Vilnius--Telephone stations)   (MLRA 9:6)

Decoration and Ornament, Architectural

Architectural details from decorative concrete. Bul. stroi. tekh.
No. 16, 1950.

Monthly List of Russian Accessions, Library of Congress, November 1956, UNCLASSIFIED

L 10387-63   EWP(r)/EWT(m)/BDS--AEDC   S/0182/63/000/005/0027/0031
ACCESSION NR: AP3000081

AUTHOR: Kononenko, V. G.; Kushnarenko, S. G.; Kotel'nikov, V. I.; Rayzman, D. A.;
Checheta, I. A.

TITLE: New impact testing machines for high-rate mechanical testing of materials

SOURCE: Kuznechno-shtampovochnoye proizvodstvo, no. 5, 1963, 27-31

TOPIC TAGS: impact testing machines, explosion-actuated machines, high
deformation rates, wide temperature range, subzero tests

ABSTRACT: The Khar'kovskiy aviatsionnyy institut (Khar'kov Aviation Institute)
has built and tested two new explosion-actuated machines for high-rate tension
tests of various materials over a wide temperature range. The first, a
telescopic-type machine, is capable of testing at deformation rates of 15 to
300 m/sec and temperatures of -196 to +1200C. The second, a lever-type machine,
was successfully tested in the same temperature range at deformation rates of
10 to 50 m/sec. At higher deformation rates the telescopic-type machine gives
better results than the lever type. In both, loading is effected by detonating

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a measured explosive charge. Strain is measured by a wire strain gauge,
registered on the screen of an oscillograph, and recorded photographically.
In high-temperature tests the specimens are heated by a furnace which is quickly
removed just before the explosive charge is detonated. In subzero testing the
specimens are cooled in liquid nitrogen or a mixture of liquid nitrogen and
benzene. Orig. art. has: 8 figures.

ASSOCIATION: none

SUBMITTED: 00   DATE ACQ: 17Jun63   ENCL: 00

SUB CODE: 00   NO REF SOV: 004   OTHER: 002

Card 2/2 ph/

IVANOVA, A.A., VASIL'YEVA, S.A.: FALUNIN, A.F.: RAYZMAN, F.B., redaktor;
    MARTYNENKO, D.P., redaktor; SOKOLOVA, R.Ya., tekhnicheskiy redaktor

[Direct system of long distance telephone operation] Nemedlennaia
sistema ekspluatatsii mezhdugorodnykh telefonnykh sviazei. Moskva
Gos. izd-vo lit-ry po voprosam sviazi i radio, 1953. 31 p.
  [Microfilm]   (MLRA 8:8)
        (Telephone)

ACC NR: AP6035498 (N) ED/GI   SOURCE CODE: UR/0006/66/000/006/0009/0013

AUTHOR: Reyman, G. P.

ORG: none

TITLE: On the problem of vertical refraction

SOURCE: Geodeziya i kartografiya, no. 6, 1966, 9-13

TOPIC TAGS: light refraction, theodolite, triangulation

ABSTRACT: The problem of light refraction in the vertical plane has not as yet been
solved and this leads to serious errors in triangulation an. leveling by means of light
or radio beams. The selection of a correct coefficient of refraction requires exten-
sive experimentation under all types of climatic, topographic and physical conditions.
The mountain environments are the most important at the present time. The author dis-
cusses the methods proposed by Sviridov and Mirkin and discusses the work done at the
Tashkent Institute of Topography in 1964. The area used for student training at the
Institute lies on the upper terrace of the Chirchik river and represents a gently rol-
ling plain at the foot of mountains, which slopes to the southeast. The region is open
to invasion by air masses from the north and northeast. The climate is characterized
by sharp annual and diurnal variations of temperature. Summers are hot and winters are
cold. The air is generally dry, the atmospheric precipitation not exceeding 300 mm per

UDC: 528.024.4.061.2

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L 08884-67
ACC NR: AP6029456

year. The theodolite used for these measurements was carefully checked out and found to be adequate. The observations on the refraction were carried out with a theodolite, mounted on a pedestal. Four triangulation stations, A, B, C, and D, were used as targets and their zenithal distances were determined every two hours between 8 am and 8 pm. The order of readings was A, D, B and C on the first run and the reverse on the return. Each pair of readings was then averaged. Readings on the psychrometer and four barometer aneroids were taken at the mean time of observation of each pair of readings. All readings were carefully corrected for instrument error and climatic conditions. Coefficients of refraction determined for each of the four directions are given in a table for the period between 10 am and 6 pm. It is obvious that the coefficient of refraction depends mainly on the distance. For the given climatic and geographic conditions, the coefficient of refraction is close to zero for distances of about 7 kilometers. It is positive for greater distances and negative for shorter distances. The best time for observation, characterized by the stability of the coefficients, is between noon and 2 pm. Orig. art. has: 2 figures, 4 tables.

SUB CODE: 08,14/   SUBM DATE: none/   ORIG REF: 009

RAYZMAN, G.P.

Using the periodical "Geodeziia i kartografiia" in school.
Geod. i kart. no.2:48-50 F '61.   (MIRA 14:9)
                    (Surveying--Study and teaching)
                    (Cartography--Study and teaching)

L 13803-63   EWP(q)/EWT(m)/BDS   AFFTC/ASD   JD/JG

ACCESSION NR: AP3003758   S/0075/63/018/007/0829/0834

AUTHOR: Yatsimirskiy, K. B.; Rayzman, L. P.

TITLE: Determination of zirconium and hafnium occurring together, on the basis of their catalytic effect

SOURCE: Zhurnal analiticheskoy khimii, v. 18, no. 7, 1963, 829-834

TOPIC TAGS: zirconium, hafnium, iodide oxidation, hydrogen peroxide, iodine, optical density, catalytic effect, analytical determination, zirconium-hafnium salt mixture, simultaneous determination, standard solution, calibration curve

ABSTRACT: Oxidation of an iodide ion by hydrogen peroxide in the presence of zirconium and hafnium salt catalysts in an acid medium has been studied 1) to establish the effect of pH on the oxidation rate, 2) to study the joint effect of both catalysts on this rate, and 3) to develop an analytical method for the deter-mination of both elements simultaneously present in solution. The experiment was conducted either with pure HCl-acidified solutions of zirconium or hafnium salts, or with mixtures of the salts added to a mixture of potassium iodide and hydrogen peroxide solutions. The optical density of the iodine gradually evolving (in the presence of starch) indicated the reaction rate at any given time. The results were

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ACCESSION NR: AP3003758

recorded automatically. The concentrations of the reactants were KI, 6×10^{-4} M; H_2O_2, 6×10^{-4} M; starch, 0.004%; Zr, 0.1×10^{-5}—1.0×10^{-6} M; and Hf, 0.1×10^{-6}—1.0×10^{-5} M. The pH was 0.4—2.8. All experiments were conducted at 25.0 ± 0.1C. The results were obtained as straight-line plots of time versus optical density; plots of the slopes (tan α) (i.e., reaction rate) versus pH revealed maxima at pH 1—1.1 for zirconium salt solutions, and pH 2.1—2.2 for hafnium. Further analysis of the data, which took into account the concentrations of all possible particles, i.e., ions of partially or totally hydrolyzed zirconium or hafnium salt, hydroxyl complex ions such as $Zr(OH)^{3+}$, etc., indicated that the $Zr(OH)_2^+$ and presumably $Hf(OH)_3^+$ ions seem to be the catalytically active particles and that their maximum concentrations are at pH 1.1 and 2.1—2.2, respectively. The additive effect of the catalysts when present together was established by determining the linear analytical function proportional to their total concentrations, C_{Zr} or C_{Hf}:

$$k_2' \tan \alpha - k_2 \tan' \alpha = (k_2 k_1' - k_1 k_2')C_{Zr}$$

$$k_1 \tan' \alpha - k_1' \tan \alpha = (k_2' k_1 - k_1' k_2)C_{Hf}.$$

Mathematical analysis of the reaction kinetics established four constants for Zr and Hf at pH 1.1 and 2.2, respectively: k_1, $0.913 \pm 0.066 \times 10^5$; k_1', $0.106 \pm 0.007 \times 10^5$; k_2', $0.943 \pm 0.43 \times 10^5$; k_2, $2.16 \pm 0.13 \times 10^5$. Fluctuations in the values

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ACCESSION NR: AP3003758

are caused by possible differences in solution concentrations and reaction conditions. The difference in catalytic effect was used in an analytical method for approximate determination of small concentrations of Zr and Hf simultaneously present in solution. The four constants are determined in each case, after which calibration curves of the analytical function depending on tan α at both pH values and including all four constants are plotted separately for several standard concentrations of Zr and Hf (see Figs. 1 and 2 of the Enclosure). After determining tan α at pH 1.1 and 2.2 for the unknown mixture, the sought concentrations are determined graphically. The mean error of the method is ±15%. The absence of systemat:- error confirms the additive nature of the catalytic effect. Orig. art. has: 4 figures, 2 tables, and 12 formulas.

ASSOCIATION: Ivanovskiy khimiko-tekhnologicheskiy institut (Ivanovo Institute of Chemical Technology)

SUBMITTED: 21Sep62   DATE ACQ: 08Aug63   ENCL: 02

SUB CODE: CH   NO REF SOV: 004   OTHER: 000

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